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The mega-mergers: How they're working

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BN shops: Cutting costs—not quality

RAILWAY AGE

October 25, 1982

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Inside

LUTHER S. MILLER

IMPORTING CARS, EXPORTING JOBS

At a time when the freight-car business is mired at Great Depression levels, the passenger railcar market is experiencing an almost unprecedented boom. So far this year U.S. rail transit authorities have placed orders for cars valued well in excess of $1 billion—about five times as much business as the freight railroads have placed with freight-car builders. In October alone new transit-car orders worth nearly $400 million were announced (p. 8).

This counter-cyclical buying should be great news for the U.S. railway supply industry, but it isn't. The fact is, much of this billion-dollar bonanza has gone to foreign builders. They are competent builders who for the most part have earned the business fair and square; they will supply an excellent product. Still, the bulk of the jobs will be created abroad; the bulk of the profits will go offshore.

What has caused this flight of business overseas? Mainly the fact that foreign governments for many years have encouraged the development of transit technology and are now encouraging its export, often with financial assistance; the U.S. hasn't.

It's too late to recover the lost business; but it isn't too late for Washington to begin to move to help ensure that U.S. industry in future gets a bigger share of U.S. business—and maybe some export business to boot. If the Reagan people don't know how to go about it, perhaps they could send a delegation to Paris or Tokyo to make enquiries.

RETURN ON INVESTMENT: THE TOP 20

How close are the railroads to achieving the 16.5% return on investment that the ICC has determined to be fair and reasonable? Not very, according to statistics released early in October by the Commission. For the 12-month period ended June 30, 1982, the industry as a whole—33 Class I railroads—reported net railway operating income of $996 million, which produced a rate of return of 1.51%. Individual railroad performance varied widely—from the Clinchfield's 17.12% to the zero return reported by several carriers. These were the top 20 performers:

TWELVE MONTHS ENDED JUNE 30, 1982

Railroad	Net Railway Operating Income (000 omitted)	Return on Investment (Percent)
1. Clinchfield	$24,350	17.12
2. Norfolk & Western	294,587	12.91
3. Missouri-Kansas-Texas	22,703	9.20
4. Chesapeake & Ohio	104,594	8.92
5. Kansas City Southern	30,044	7.74
6. Missouri Pacific	173,897	7.41
7. Rio Grande	27,500	7.24
8. Southern	191,506	7.11
9. Western Maryland	9,987	6.23
10. Louisville & Nashville	83,405	5.78
11. Soo Line	23,840	5.74
12. Union Pacific	161,500	5.56
13. Bessemer & Lake Erie	7,818	4.99
14. Santa Fe	117,366	4.14
15. St.Louis Southwestern	24,761	3.81
16. Burlington Northern	142,269	3.60
17. Elgin, Joliet & Eastern	4,077	2.77
18. Grand Trunk Western	8,176	2.62
19. Florida East Coast	4,696	2.57
20. Duluth, Missabe & Iron Range	1,817	1.71

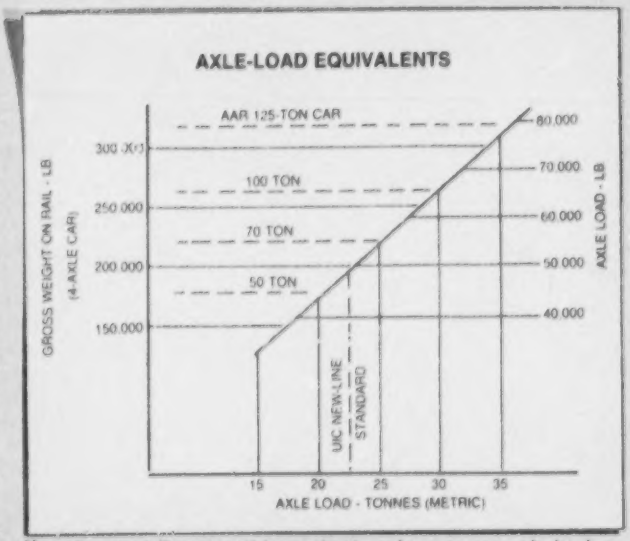
BN's heavy-haul coal operations were among those examined at the second heavy-haul conference. Above, BN coal trains near Glendo, Wyo.

Meeting the heavy-haul challenge

From all over the world, railroaders with heavy-haul problems (and a few with answers) gathered at Colorado Springs recently. They compared notes—800 pages of them—and measured the progress that has been made since they first got together four years ago.

By JOHN ARMSTRONG,
Associate Editor

When some parts of the system that is a railroad are working at or beyond their comfortable limits, "experience" can grow at a rapid—if not frightening—rate. When much of that experience is being acquired in some of the least inhabited or most forbidding climes on earth, direct interchange among the pioneers can be crucial in reaching practical solutions before problems reach overwhelming proportions. Such was the situation when the first conference on heavy-haul railroading was convened four years ago in Perth under the auspices of Australian engineering organizations. Not only did the meeting put railroads faced with accelerating equipment and roadway deterioration problems in touch with each other but the 600-page proceedings have become somewhat of a bible on the subject.



Key phrase at the second heavy-haul conference was *axle load*, whether expressed in metric tonnes or the AAR car-capacity terms more familiar to American railroaders.

A second convocation on the subject, co-sponsored by AAR, FRA, RPI, AREA and ASME, was assembled at Colorado Springs Sept. 25-29 under the leadership of America's dean of rail research, Sergei G. Guins; lead time for such an international affair is eighteen months or more and "Meeting the Challenge of Increasing Tonnage" was its optimistic but logically-chosen theme. By meeting time last month it had become apparent that the syndrome that makes it unlikely for the sports hero emblazoned on the magazine cover to stay in the line-up by the time he hits the newsstands (let alone avoiding an 0 for 6 slump or worse) works worldwide in the mineral industries as well. The paramount challenge switched from *hauling* iron ore—and to varying extents the other bulk commodities of commerce—to *selling* the stuff, and for some anxious months the possibility of assembling enough participants in Colorado Springs for a meaningful exchange of experience in the face of straitened travel budgets was far from a sure thing.

In the end, however, close to 300 participants assembled to hear, discuss and take home with them the 72 technical papers forming the 800-page proceedings of this second conference on the most efficient ways to move vast tonnages overland under any combination of trying environments, natural or man-made. Fourteen North American railroads were represented; worldwide, substantial groups of railroaders, researchers and suppliers participated, with Australia, Japan, China, South Africa, France, Germany, Scandinavia and Great Britain particularly well represented.

• **How heavy?** A heavy-haul railroad may be defined as one where the requirement to transport major tonnages of relatively low specific value at a marketable cost (with or without other traffic on the same route) leads to the use of high axle loads over trackage whose capacity is closely tailored to the flow. Competitive pressures favoring the 100-ton

car have put much of the North American network into this category, as cogently emphasized by Conrail's L. Stanley Crane. By this definition, heavy-haul lines come in shapes and sizes ranging from long and skinny to short and fat; characteristics of the specific routes represented by papers at the second conference, reduced to common North American engineering units (short tons, miles), are presented in Table I.

Many other heavy haul railroads, including such exemplary lines as Brazil's Vitoria-Minas Railway which operates 14,400 trailing-ton trains with eight-axle locomotives over meter-gauge track, were repre-

Table I Summary of Heavy-Haul Railroads

Railroad route	Principal route length miles	Heavy-haul start date	Principal traffic	Gauge	Trackage	Pass. track spacing (typical) miles	Loaded trains per day	Propulsion	Train consist: Locos.	Cars	Net tons/car
Africa											
South African Rys. Ermelo-Richards Bay Trunk	262	1976	Coal & mixed	3'6"	Single/ 20% double	7	16	Electric 25kv 50Hz	4	88	64
	c.280	1986	"	3'6"	Single/ 20% double	7	9	Electric 25kv 50Hz	4	200	94
Line through rugged territory (36% curved) to be doubled in coal export capacity while retaining mixed traffic capacity. Radial trucks.											
South African Rys. Sishen-Saldanha Line	535	19 76	Iron ore	3'6"	Single	53	3	Electric 25kv 50Hz (since 1979)	3	210	94
New direct ore export route. All cars equipped with radial self-steering (cross-braced) trucks.											
Asia											
Chinese People's Republic Rys. Typical high-density routes	— —	— —	Minerals, fgt. & psgr.	4'8½"	Double	—	50	Electric/ diesel/steam	—	—	50
Rapidly expanding network with dense freight & passenger traffic.											
Australia											
Queensland Railways Goonyella Line	125	1970	Coal	3'6"	Single	15	6	Diesel	3 + 3	148	63
Remote control mid-train units used to meet capacity requirements. Aluminum-body gondolas for corrosion resistance.											
Hamersley Iron Paraburdoo-Tom Price-Dampier	237	1966	Iron ore	4'8½"	Single/ 14% double	16	7	Diesel	3	180	106
Original 118 lb. rail replaced as tonnage outgrew original capacity estimates by 300%.											
Mt. Newman Mining Mt. Newman-Port Hedland	253	1968	Iron ore	4'8½"	Single	16	10	Diesel	3	144	104
Railroad now moving to 8% higher axle loading. Steel ties being installed (50,000 yr) following 180 MGT test.											
Westrail Kwinaka-Koolynobbing Main Line	310	1966-1982	Ore, grain Mixed traffic	4'8½"/ 3'6"	Single/ double	—	—	Diesel	Mixed traffic		
Rebuilding of 1966 standard-gauge line (dual gauge over 67 mi.) deteriorating rapidly under heavier than planned traffic. Unique dual-gauge concrete ties.											
Europe											
Swedish & Norwegian State Rys. Kiruna-Svappavarra-Narvik Line	120	1903	Iron ore	4'8½"	Single	7	15	Electric 15kv 16⅔Hz	1	52	88
Patriarch of European heavy-haul routes, crossing the Arctic Circle.											
Rhenish Lignite Mining Railways Lignite-hauling line extension	33	1983	Lignite	4'8½"	Double	—	>110	Electric 6kv 50Hz	1	14	106
Overburden-disposal system	<10	1950	Gravel overburden	4'8½"	Double	—	>200	Electric 6kv 50Hz	1	10	216
Special-purpose haulers built with 19 ft. track centers to accommodate oversize cars: overburden — 8-axle side-dump; lignite — 4-axle saddle-dump											
North America											
Burlington Northern Wyoming coal routes	800-1500	1970's	Coal	4'8½"	Single → 30-50% double	10	10 → 30	Diesel	4	110	100--105
Expanding capacity of previous low-density routes by track-upgrading, ctc, siding extension double tracking, manned helper locomotives as required.											
Canadian National Edmonton-Vancouver main line	750	1970's	Coal, grain, bulk & premium fgt.	4'8½"	Single → 50% double	10	10 → 18	Diesel	3	100	100
Track upgrading completed—siding extensions, extensive double tracking in progress.											
Canadian Pacific Calgary-Vancouver main line	650	1970's	Coal, grain, bulk & premium fgt.	4'8½"	Single → 30% double	10	15 26	Diesel	4 + 2 + 6 3 + 2	108 111	100-105
Three westbound bottlenecks reduced to 1.0% by 1981. Final grade reduction requires 9 mi. tunnel (1986). Remote control mid-train locomotives.											
FAST Transportation Test Ctr., Pueblo	4.8	1976	Test train	4'8½"	Single	—	125	Diesel	4	65	100
Track structure/rolling stock test track—included for comparison with real-world service.											

N.A. Not available. All tonnage figures in short tons (2000 lb.)

sented in the presentations of the first Heavy Haul conference. Taken together, the two present a comprehensive worldwide picture of combinations of loads, geometry, materials, maintenance and operating practice which are moving the goods with efficiency and dispatch.

At the time of the first conference the increasing role of fatigue in supplanting wear as the terminator of rail life was becoming apparent. With a plague of other problems besieging those routes called upon to handle unprecedented (and often unplanned for) GTM levels, panic was in the atmosphere. How far and how irretrievably past center had

Trailing gross tons	Ruling grade		Max. Speed		Gross Trailing tons/yr (per track) millions	Gross Accum. tonnage, (per track)	Axle load (car) lb	Rail weight lb/yd	Ties type	Spacing inches	Curvature (typ. maximum) degrees
	Against loads %	Against empties %	Loaded train mph	Empty train mph							
7,780	1.5	1.5	37	45	53	200	44,100	114	Concrete	27.5	3.5
22,900	0.6	1.5	37	45	105	—	57,300	120	Concrete	25.6	3.5
24,100	0.4	1.0	43	43	22	120	57,300	120	Concrete	25.6	2.0
2,500 avg.	0.6 typ.	0.6 typ.	—	—	40	—	50,000	121	Concrete	19.5, 21.5	3.1
11,600	1.0	2.0	37	37	32	220	39,100	107→ 120	Wood→ concrete	24 27	5.8
23,700	0.3, 0.4	2.0	43	46	70	690	65,800	136	Wood→ concrete	25	4.5
18,900	0.55	1.5	40	46	55	650	65,800→ 71,650	132	Wood→ steel	26	3.0
	N.A.	N.A.	43	56	12	—	53,000	94→ 120	Wood→ concrete	24 26	4.5
5,700	1.0	1.0	31	37	31	>500	55,000	100/ 108	Wood	19.5	N.A.
1,930	0.6	0.6	37	37	>40 by 1995	—	69,000	120	Wood	N.A.	2.6
2,650	1.4	1.4	37	37	Shifting routes	—	66,200	120	Wood	N.A.	—
14,500	0.5	0.5 >	45	50	50→ 100	—	65,800	136	Wood	19.5	2-8
13,200	0.7	0.7	50	50	50→ 85	—	65,800	136	Wood→ concrete	195 24	6
14,000 14,700	2.2→ 1.0	2.2	50	50	41→ 72	—	65,800	136	Wood	19.5	2-10 2-6
8,500	20	2.0	45	—	100-150	150-600	65,800	136	Wood, concrete	19.5 24	5.0

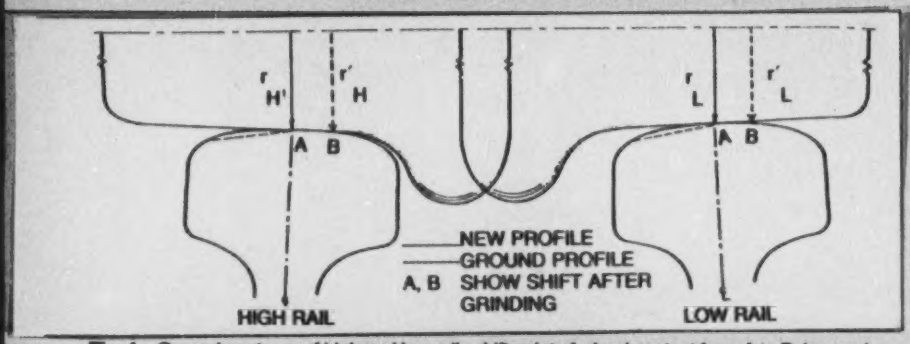


Fig. 1 Ground contours of high and low rails shift point of wheel contact from A to B, increasing differential rolling radius to an extent making wheelset self-steering on curves up to somewhat over two degrees of curvature. Gauge corner of high rail is also relieved slightly to avoid contact with flange throat.

the axle load pendulum already swung with the 100-ton car?

With its program to upgrade main lines to 22.5 tonne axle loads in Western Europe moving along, the UIC was still comfortably below the 70-ton standard looked upon by American trackmen as "the good old days", but heavy haulers working their remote lines flat out to keep ahead of the ore ships in the harbor were having recurrent nightmares in which entire mainlines disintegrated into short chunks of rail at an unpredictable rate.

Four years later at Colorado Springs the mood was relatively upbeat. Mysteries remain in some areas, but results of the continued application of higher powered measurement and analysis technology, in both research and day by day operation and maintenance, have begun to show up. Longer and more predictable rail life, fewer derailments, and better-established judgement calls in deciding how to design track and wheels to live together are the payoffs.

• A capsule of progress. Heavy, homogeneous traffic helps clarify the picture as wheels and rail interact, so it may well be easier to apply research-sharpened answers effectively on a single-purpose railroad than in the councils of the AAR. As examples of what can be done in putting knowledge to work, though, the two Pilbara-region ore hauling lines in Australia are certainly worth a look. When it comes to selling iron ore, Hamersley Iron and Mt. Newman Mining are competitors; when it comes to supporting research on ways of hauling ore more cheaply, they have been partners in sponsoring work at the Melbourne Research Laboratories of parent steelmaker Broken Hill Proprietary. Considerable traffic in senior rail researchers between BHP and organizations in Canada and the United States has also stirred the pot, making results from Down Under intelligible and usable Up Over as well.

Originally expected to handle a few million tons of ore a year, Hamersley Iron's 118-pound rail broke down quickly when traffic soared and it had to be replaced in toto with 136-pound steel after only about 200 MGT—failures were so frequent that train delays for maintenance prevented meeting tonnage requirements. Understandably concerned about the life of its second suit of rail, Hamersley has developed to a fine point the preservation of a favorable rail/wheel interface throughout the wear cycle. Grinding capacity needed to keep up with corrugation problems has been put to use to create and maintain a set of asymmetrical railhead profiles (Fig. 1) which—with the relatively controlled wheel tread contours on the line—have demonstrated flange-free tracking through curves up to two degrees; this includes almost all of the route. The resulting absence of side wear on the railhead eliminates the need to transpose rail and increase headwear allowable before replacement to 35%.

Overall, contouring which uses no more rail grinding time than formerly needed for corrugation control has saved 30 miles of programmed curve rail replacement in its first two years—at the moment there is "a slightly embarrassing stockpile" of premium rail on the property.

Control of the interface by modifying railhead contour was indeed one of the concepts most in evidence at the Conference. Britrail is not usually thought of as a major heavy hauler—although the 25 tonne (55,100-pound) axle load it allows on "merry go round" mineral trains is well ahead of Continental practice—but a railhead *planing* process developed there may well be one of the bigger things benefitting high axle load railroading. Curveworn rail on British passenger routes cannot be transposed to complete its service life because its head shape will cause hunting in the HST 125 coaches. A rail planing cutter dragged over the rail while in place at about 2 mph takes a succession of seven cuts which restore its contour, for further life in that location or in relay. It works on rail of up to 350 BHN hardness and is expected to result in as much as 15% overall reduction in new rail requirements systemwide.

• Pinpointing fatigue probabilities. On the Mt. Newman iron-ore line it's accepted that the high axle loads that allow moving the tonnage with minimum investment in trackage, cars and power will result in making fatigue the life-terminating factor for much of its rail. How do you predict when a section of rail will reach the point where it is generating defects at a rate requiring renewal? The whole railroad can't be re-railed at once, and responding in fire-drill fashion after the fact is not way to use track time and maintenance crews effectively.

Plotting the incidence of detected defects in alternate curved and tangent sections over the whole line (Fig. 2) showed extreme variability. Some of the rail is obviously overdue; other sections have years ahead of them, and a normal re-railing segment would probably include some of both. A best-fit statistical analysis was used to seek out those factors that do in fact significantly affect the rate of defect occurrence. Curvature, transposition history and steel cleanliness (top of ingot, semi-killed, fully-killed ranking from worst to best in this respect) were found to be significant. To combine these factors with specific defect history (in 450-yard segments considered to represent economically acceptable units for re-railing) and to interweave the scheduling and cost aspects of the rail grinding program with the result (you don't want to grind a rail that's going to be replaced next week anyway) would seem to require an excruciatingly complex programming development on the part of the MRL-Mt. Newman team. However, the attractive bottom line is a replacement and grinding schedule for the whole line which it is calculated has already saved over $1 million dollars in postponed re-railing without increasing fatigue failure.

On the basis of all this Mt. Newman be-

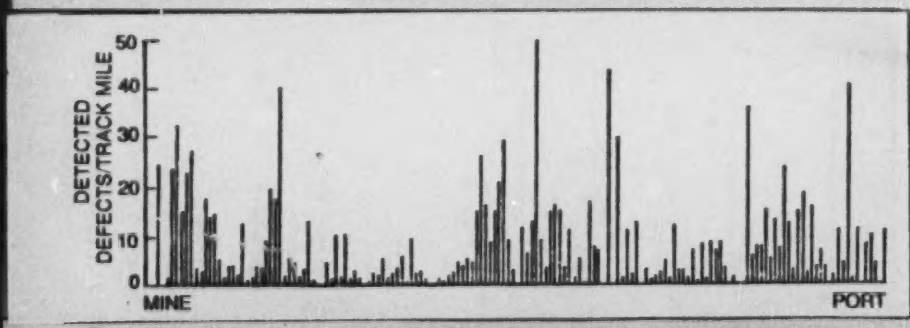


Fig. 2 Density of detected rail defects in alternate tangent and curved segments of Mt. Newman Mining Co. railroad varies from zero to over 45 per mile, indicating that only a highly selective rail renewal program will eliminate steel reaching the end of its economic life. Chart covers 253 miles.

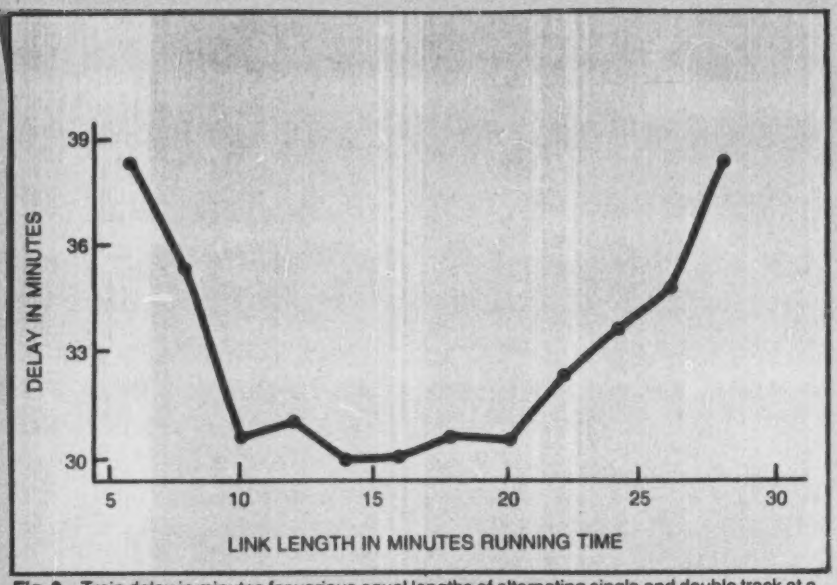


Fig. 3 Train delay in minutes for various equal lengths of alternating single and double track at a traffic density of 60 trains per day, based on computer simulation by BN including such factors as speeds through turnouts, train lengths and horsepower horsepower/ton for representative coal traffic consists.

lieves that lower ore transportation costs will result from *increasing* the axle load. Raised to 32.5 tonnes (71,650 pounds) now, it will go up another 7% if results stay in line with expectations. Another result of the rail analysis is a decision to use head-hardened rail for all future replacements, on tangent as well as curved track; reductions in corrugation, fatigue and hunting-inducing wear are calculated to repay the premium.

When it comes to ties, Mt. Newman and Hamersley read the print-outs differently. Mt. Newman believes the Trakloc fastening and rubber pad combination on which it has accumulated 180 MGT of test data overcomes historical steel-tie problems; it will be putting in 50,000 a year. Hamersley is going the concrete route.

The asymmetrical railhead for a better wheel-rail match is not a new concept (the 11523 section of many years ago being of that type), but practical rail wear data based on its extensive use is an interesting addition to the body of information making up the state of the art, whether or not a railroad running mixed traffic and handling foreign cars can use it directly.

• **Putting sidings in the right place.** Coal tonnage growth in some areas has remained in synch with the conference theme; another major topic of discussion was the evolution of erstwhile moderate-traffic main or secondary lines into true heavy haulers as a flood of unit trains is interwoven with existing traffic. Burlington Northern and the two Canadian transcontinentals have of course been studying the matter of adding capacity without breaking the piggy bank as an item of more than academic interest. BN, in fact, has been so busy devising and running train performance simulations over its thousands of miles of line impacted by coal traffic that it has had to make some quick planning judgements on the basis of evolving rules of thumb that have demonstrated they can do a pretty good job in simulating results of more detailed simulations.

Consider the implications of Fig. 3, lifted from BN's discussion of heavy-traffic trackage-expansion strategy. For alternating stretches of single and double track, so long as all the links are close to the same length, train delays over the range of link lengths from 10 to 20 minutes running time (about 8 to 16 miles at 50 mph) don't vary significantly. This can represent a major element of flexibility for the planner who must adapt theory to conditions out in the field. Simulations with track segments out of service for maintenance point out the value of providing midpoint double crossovers in every 10 mile section of double track which is added to emerging heavy-traffic lines, and that's what you'll find going into place, in Nebraska or Wyoming or wherever else BN's program is reaching that stage.

Canadian National (whose problem getting through the mountains to Vancouver is primarily continual curvature) and Canadian Pacific (whose shorter line bottlenecks at points where divides are crossed only with tonnage-sapping grades) are working toward the same general single-double track configurations. CN is naturally farther along in testing the effectiveness of radial trucks in keeping rail maintenance-free longer on its single segments; CP weighs remote-control locomotive/train/ventilation combinations that will allow full-tonnage operation through the nine mile tunnel which is needed to make it a 1.0% route all the way, seeking a solution short of accepting the engine-change delays of a short electrification. On a ton-mile total basis, any of these long routes will take a place near the head of the class of heavy haulers.

• **What we still don't know.** The con-

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ference was considerate enough to amplify understanding of the importance of some problems without providing solutions which would eliminate the need for further research. Some examples:

—None of the theories seeking to explain what causes rail corrugations to start and spread fit all the facts; weld irregularities in the FAST corrugation experiments did not trigger their formation as had been expected, but something else sure did, and the effects of fast-spreading corrugations on track maintenance costs were confirmed.

—Flat wheels, particularly on passenger cars at Corridor speeds, have a devastating effect on concrete ties. Softer pads help mitigate the tie-bending loads, but reintroduce questions of life and stability.

—Attempts to quantify the short and long-term reactions of ballast and subgrade under conditions of confinement that bear any relationship to the actual situation in track have a long, long way to go.

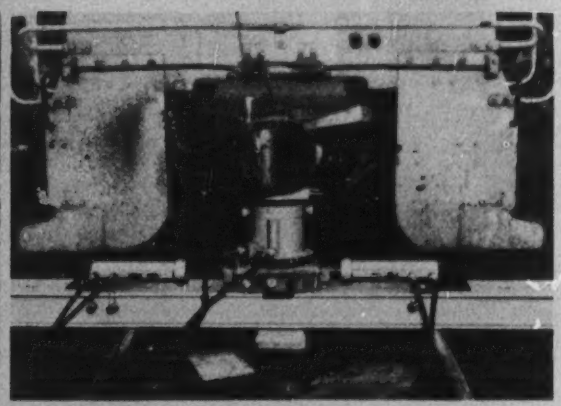
—Rail metallurgy and welding processes that will yield a railhead weld and heat-affected zone combination with hardnesses close enough to that of the rail to eliminate batter remain elusive; you can choose whether you get a "single dipper" or a "double dipper," but so far you must accept one or the other.

—British work indicates that the "natural" (gravity-free) vertical attitude of the rail itself is surprisingly influential in determining the pattern of degradation of track surface under traffic. Roller-straightened rail's end deviations and residual stresses therefore assume increased importance. Possible improvement: a French (Sacilor) experimental process designed to straighten rail by axial stretching.

In view of the evident interest in and benefits already realized from the ad-hoc, informal interchange of knowledge at the two heavy-haul conferences, sponsors voted to undertake the establishment of a permanent secretariat, supported by all interested railroads of the world, to serve as a clearing house for information and advancements in the industry relating to productivity, capacity, improved signal systems, high density traffic, and heavy loads.

Formation of an advisory committee [composed of single members representing railroads in the following groupings: Africa; Asia; Australia (private); Australia (public); Western Europe; North America; South America; at large] is contemplated to assist in development of organizational policy and to assure that a conference furthering its aims be held within five years. Pending establishment of the secretariat, the office of Dr. W.J. Harris, Jr. (AAR vice president of research and tests) will serve as a focal point. ■

Hoesch rerails fast



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Market

CARLOADINGS

Loadings of revenue freight in the week ended Oct. 2 totaled 373,148 cars, according to the Association of American Railroads. This was a decrease of 78,368 cars, or 17.4%, compared with the corresponding week last year. Ton-miles generated by carloadings in the week ended Oct. 2 are estimated at 15.7 billion, a decrease of 19.5% below the corresponding week of 1981.

REVENUE FREIGHT CARLOADINGS

Commodity	Oct. 2 week	Sept. 25 week
Grain	23,872	15,051
Other farm products	2,805	2,233
Metallic ores	11,482	11,665
Coal	119,532	83,184
Crushed stone, gravel & sand	9,945	6,998
Nonmetallic minerals	9,946	7,803
Grain mill products	12,368	10,091
Food & kindred products	14,162	10,538
Primary forest products	14,962	10,899
Lumber & wood products (except furniture)	6,926	4,727
Pulp, paper & allied products	16,194	13,651
Chemicals & allied products	22,587	18,088
Petroleum products	4,855	3,411
Stone, clay & glass products	11,475	8,918
Coke	4,437	3,957
Metals & products	8,042	6,264
Motor vehicles & equipment	12,581	11,633
Waste & scrap materials	8,008	5,782
Forwarder & shipper assn. traffic.	8,318	6,723
All other carloads	50,451	38,086
LCL traffic	200	183
Total Cars Loaded	**373,148**	**279,885**
Cumulative total, 40 weeks	**14,489,068**	**16,804,568**
Estimated revenue ton-miles (billions), 40 weeks	**617.4**	**706.1**

PIGGYBACK LOADINGS

U.S. piggyback loadings for the week ended Sept. 25 totaled 34,448 cars (7.7% below the corresponding 1981 week) and 57,998 trailers or containers (up 14.8% from 1981). Cumulative volume for the first 39 weeks of 1982 is 1,413,096 (up 9.2% from 1981) and 2,477,505 trailers or containers (up 6.3% from 1981).

CANADIAN CARLOADINGS

Canadian railway revenue freight loaded in the nine-day period ended Sept. 30 totaled 5.1 million metric tons (off 21% from 1981). Cars loaded totaled 81,077 (off 19% from 1981). Cumulative loadings for 1982 were 153.9 million tons (off 11% from 1981). A metric ton equals 2,204.6 pounds.

• *New York City Transit Authority*.—Has awarded the following contracts: $5.5 million to General Railway Signal for updating the signal system and switch controls governing train movements between Crescent Street and Cypress Hills stations in Brooklyn; $5.8 million to Delma Construction Co. for construction of an automatic substation that will replace a 59-year-old manually operated station beneath Pearl Street in downtown Manhattan; and $11.7 million to Karl Koch Erecting Co. for rehabilitation of a section of elevated line in Queens (involving replacement of 80 steel support columns, adjustment of 60 columns, and repositioning of 231 track stringers; work to be completed in the winter of 1984.)

• *Republic of Senegal Railways Department*.—Awarded a contract to Cubic Communications, subsidiary of Cubic Corp., for installation of a two-way radio communications system for a rail line extending from Dakar east into Mali. Cubic Communications will provide five fixed high-frequency radio stations and two vehicle-mounted stations, and will complete the project by early next year.

• *Tunisian National Railway Co*.—Awarded a $26-million (Canadian) contract to Bombardier for the supply of 22 diesel-electric locomotives. Included are 13 2,200-hp meter gauge and nine 2,400-hp standard gauge units.

• *Washington Metropolitan Area Transit Authority*.—Awarded a $260,000 contract to UTDC (USA) of Detroit, a subsidiary of the Toronto-based Urban Transportation Development Corp., for design and development of a steerable transit-car truck for the Washington Metro. UTDC Research and Development Ltd. will perform the major part of technology. The objective, says UTDC, is to design a modification to existing trucks. Steerable trucks designed by UTDC Research and Development arenow under test at the UTDC Development Center near Kingston, Ont.

ESTIMATED OWNERSHIP—ALL REVENUE FREIGHT CARS

September 1, 1982 vs. September 1, 1981

		Box	Covered Hopper	Gondola	Hopper	Flat	Refg.	All Others	TOTAL
Class I RRS	1982	291,735	170,037	139,171	298,910	88,691	56,545	23,573	1,068,662
	1981	321,373	172,782	143,362	308,977	91,924	59,631	25,981	1,124,030
Class II RRs & S&T Cos.*	1982	52,488	9,399	10,704	12,980	4,725	3,463	3,368	97,127
	1981	56,795	9,448	11,420	13,458	5,453	3,630	3,252	103,456
Railbox-Railgon	1982	24,939		3,999					28,938
	1981	24,890		3,753					28,643
RRO&C** Refgs.	1982						3,549		3,549
	1981						3,232		3,232
Private	1982	510	130,079	27,571	21,314	52,776	6,000	189,930	428,180
	1981	834	124,627	24,223	21,153	52,209	8,361	189,851	421,258
GRAND TOTAL	1982	369,672	309,515	181,445	333,204	146,192	69,557	216,871	1,626,456
	1981	403,892	306,857	182,758	343,588	149,586	74,854	219,084	1,680,619

* Class II railroads and switching and terminal companies.
** Railroad owned and controlled refrigerator car lines.